F14 8:40 Exam 3
Linear Algebra, Dave Bayer

[1] Find the determinant of the matrix

$$\begin{bmatrix} 4 & 6 & 2 & 1 \\ 2 & 1 & 2 & 1 \\ 1 & 6 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$$

[2] Find the inverse of the matrix

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 2 & 0 & 1 \\ 3 & 1 & 2 \end{bmatrix}$$

[3] Using Cramer's rule, solve for z in the system of equations

$$\begin{bmatrix} 1 & a & 1 \\ 2 & b & 3 \\ 1 & c & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 2 \\ 1 \end{bmatrix}$$

[4] Find the characteristic equation and a system of eigenvalues and eigenvectors for the matrix

$$A = \begin{bmatrix} 0 & -1 \\ 3 & -4 \end{bmatrix}$$

[5] Let $f(n)$ be the determinant of the $n \times n$ matrix in the sequence

$$\begin{bmatrix\,\end{bmatrix} \quad \begin{bmatrix} 2 \end{bmatrix} \quad \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix} \quad \begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 2 \end{bmatrix} \quad \begin{bmatrix} 2 & 1 & 0 & 0 \\ 1 & 2 & 1 & 0 \\ 0 & 1 & 2 & 1 \\ 0 & 0 & 1 & 2 \end{bmatrix} \quad \begin{bmatrix} 2 & 1 & 0 & 0 & 0 \\ 1 & 2 & 1 & 0 & 0 \\ 0 & 1 & 2 & 1 & 0 \\ 0 & 0 & 1 & 2 & 1 \\ 0 & 0 & 0 & 1 & 2 \end{bmatrix}$$

Find $f(0)$ and $f(1)$. Find a recurrence relation for $f(n)$. Express $f(n)$ using a matrix power. Find $f(8)$.